CAVES OF THE NATIONAL PARKS









SELECTED NATIONAL PARKS AND MONUMENTS WITH CAVES

ACADIA NATIONAL PARK, MAINE

APOSTLE ISLANDS NATIONAL LAKESHORE, WISCONSIN

BUFFALO NATIONAL RIVER, ARKANSAS

CARLSBAD CAVERNS NATIONAL PARK, NEW MEXICO

CHANNEL ISLANDS NATIONAL PARK, CALIFORNIA

CRATERS OF THE MOON NATIONAL MONUMENT AND PRESERVE, IDAHO

EL MALPAIS NATIONAL MONUMENT, NEW MEXICO

GREAT BASIN NATIONAL PARK, NEVADA

HAWAII VOLCANOES NATIONAL PARK, HAWAII

JEWEL CAVE NATIONAL MONUMENT, SOUTH DAKOTA

LAVA BEDS NATIONAL MONUMENT, CALIFORNIA

MAMMOTH CAVE NATIONAL PARK, KENTUCKY

OREGON CAVES NATIONAL MONUMENT, OREGON

OZARK NATIONAL SCENIC RIVERWAYS, MISSOURI

PINNACLES NATIONAL MONUMENT, CALIFORNIA

POINT REYES NATIONAL SEASHORE, CALIFORNIA

RUSSELL CAVE NATIONAL MONUMENT, ALABAMA

SEQUOIA NATIONAL PARK, CALIFORNIA

SUNSET CRATER VOLCANO NATIONAL MONUMENT, ARIZONA

TIMPANOGOS CAVE NATIONAL MONUMENT, UTAH

WIND CAVE NATIONAL PARK, SOUTH DAKOTA

American Geological Institute

National Park Service

WHY ARE CAVES IMPORTANT?

Cave environments are very stable: the climate within caves is almost completely uniform, the atmosphere rarely changes, and the temperature remains virtually constant throughout the year. This stable environment provides unique niches for animals to live in and helps to preserve archaeological, paleontological, and other materials for long periods of time.

HABITAT FOR CAVE ANIMALS: Cave animals called **troglobites** have adapted to total darkness and permanently live within the dark zones of caves.

WATER RESOURCES: A significant portion of the drinking water in the United States is stored naturally in cave-bearing rocks, such as limestone.

ARCHAEOLOGY: Our present knowledge of the early development of human beings and their cultures is intimately associated with the exploration and study of caves. People have long used caves as dwelling places, burial sites, storehouses, and ceremonial sites.

PALEONTOLOGY: Fossils are preserved within cave-forming rock, which may become exposed in the subsurface through cave-forming processes. Fossils also accumulate near openings in the ground surface such as caves, sinkholes, and tubes. These openings attract and occasionally trap animals, while other organisms may inhabit caves or be transported by water into caves.

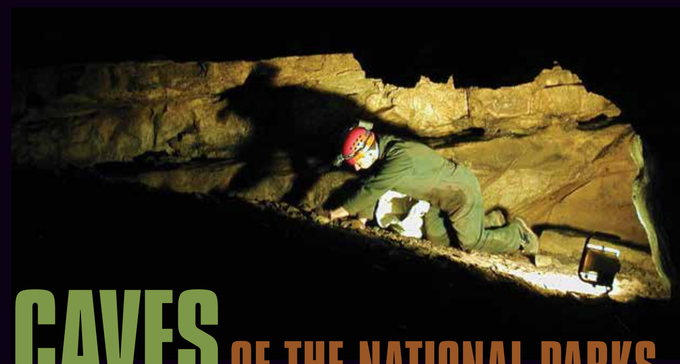
ENVIRONMENTAL HISTORY: Caves contain dissolution features, sediments, and speleothems, all of which preserve a record of the geologic and climatic history of an area. Temperature, precipitation, the nature of soil and vegetation cover, distribution of animal species, glaciation, fluvial erosion and deposition, and patterns of groundwater flow can be determined from the study of cave patterns and deposits.

NATURAL LABORATORIES AND RESEARCH: The study of caves is an important means for understanding our world. Caves provide unique, productive field sites for study because they allow direct observation and mapping of underground features. Cave systems can provide clues to understanding the nature of the overlying land surface (e.g., distribution of sinkholes) and the directions of groundwater movement.

OTHER CAVE CHARACTERISTICS

Stalactites and **stalagmites** are two of the most familiar types of **speleothems** (cave formations). Stalactites resemble icicles and hang from the ceilings of caves, while stalagmites build up from the ground. Stalactites begin as hollow "soda straws," where water droplets form a tube of carbonate material. Eventually the straw becomes clogged, forcing water to the outside of the tube were additional material builds up forming a stalactite. Stalagmites are floor deposits created when carbonate-rich water drops fall from stalactites and accumulate on the floor of a cave. Other speleothems may be classified by their shape (draperies, cave pearls, waterfalls), composition, or origin.

Many attributes are typically associated with caves. Usually the first that comes to mind is darkness; beyond the mouth of a cave, little or no light penetrates the total **darkness** of an underground space. Another unique attribute of caves is their **temperature**, which is nearly constant throughout the year, and usually warm in the winter and cool in the summer compared to outside air. In addition, seeping water moistens a cave's ceilings, walls, and floors, and the air in most caves is nearly saturated with water vapor. Constant temperature inside a cave permits high **humidity** to be maintained indefinitely.



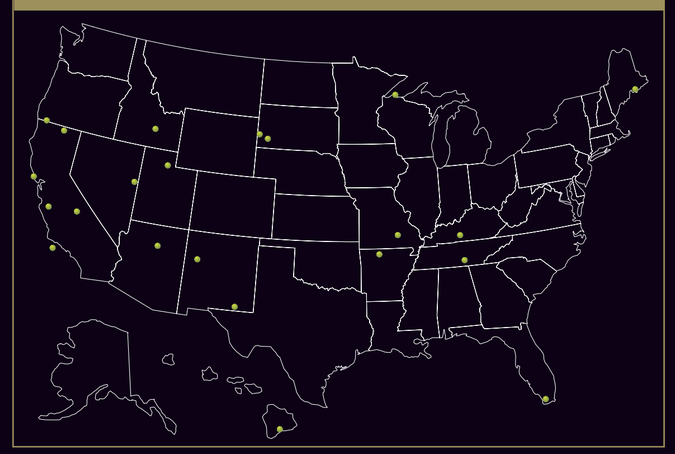
CAVES OF THE NATIONAL PARKS

CAVES are diverse, fascinating, and rich in resources such as minerals, groundwater, and archaeological and paleontological deposits. Caves also provide a unique subsurface habitat for rare animals. Throughout history, people have used caves for many purposes, from guano mining to shelters to tourism. Caves are valued by scientists for their potential to serve as natural laboratories. Caves are also precious for their aesthetic value, opportunities for exploration, and sense of adventure they provide. To learn more about caves visit the Views of the National Parks website at: http://www.nature.nps.gov/views.

What Is a Cave?

A **CAVE** is a naturally formed underground cavity, frequently containing interconnected passageways, that is large enough for a person to enter. The environments of caves are unique. Within them occur many rare resources: fragile mineral resources, cave-adapted flora and fauna, irreplaceable artifacts, and distinctive fossils. Caves also preserve a record of the earth's history and climate, which allows us to study glaciations, temperature, precipitation, erosion, and soil and vegetation cover.

LOCATION OF SELECTED NATIONAL PARKS WITH CAVES



TYPES OF CAVES




Caves occur in many shapes and sizes. The longest cave in the world is Mammoth Cave in Kentucky, with 367 miles (590.6 km) of passageways; the deepest is Krubera (Voronja) Cave in the Republic of Abkhasia, at 7,185 feet (2,190 m) deep. Caves mainly form in soluble rocks such as limestone, dolomite, gypsum, and marble, but at times form in other types of rock. There are 23 types of caves. A few are discussed below.

SOLUTION CAVES are found in limestone, gypsum, and other rocks easily dissolved in natural acid. Solution caves are formed when cracks in bedrock allow water to seep into the ground. Natural acids in the water dissolve and carry away bedrock, leaving vacant spaces. These spaces are dissolved over long periods and eventually become large enough to be called a cave.

SOLUTION CAVES IN THE NATIONAL PARKS

- Mammoth Cave National Park, Kentucky
- Carlsbad Caverns National Park, New Mexico

Hollow spaces within a cooled lava flow are called **LAVA CAVES** or **LAVA TUBES.** When lava flowing downhill from a volcano comes into contact with air, the surface of the flow forms a hard crust, allowing the center to remain molten. This flow continues downhill, eventually leaving only the hardened outer crust, which forms a lava tube or cave.

LAVA CAVES IN NATIONAL PARKS

- Lava Beds National Monument, California
- Craters of the Moon National Monument and Preserve, Idaho
- Hawaii Volcanoes National Park, Hawaii

TALUS CAVES (also known as **BREAKDOWN CAVES**) are created when piles of debris from rockslides and rockfalls fit together in an uneven pattern. This uneven pattern often forms cave-like chambers, and usually occurs in narrow fractures or canyons.

TALUS CAVES IN NATIONAL PARKS

- Pinnacles National Monument, California

SEA CAVES are formed by wave action on the rocks that line shores of lakes and oceans. They are affected by tides and are mainly found in locations with easily weathered rocks. Sea caves are enlarged and modified by abrasion with sand and gravel carried by waves and other natural processes.

SEA CAVES IN NATIONAL PARKS

- Acadia National Park, Maine
- Channel Islands National Park, California

CAVES AND CLIMATE CHANGE

Caves contain valuable data related to global climate change. Information that can reveal past climatic conditions can be derived from natural deposits stored for eons in the protected and stable environments that caves provide. Cave-dwelling organisms have specialized adaptations developed as evolutionary responses to past environmental changes and may provide valuable clues to current climate change. Organic materials preserved in caves and cores extracted from carefully selected speleothems can provide indications of paleoclimate conditions.

Learning Activity:

Making a Cave

Grade Level 7-12

BACKGROUND

We typically think of caves forming when rocks are dissolved and the particles are washed away, leaving hollow spaces behind. This process may occur when precipitation, such as rainwater or snowmelt, mixes with carbon dioxide from air and decaying plants in soil and forms carbonic acid. This acidic water flows through cracks on the earth's surface and seeps into the rocks below. Once the acidic water reaches carbonate rocks (e.g. marble, limestone, dolomite), it can seep into cracks and dissolve the rock to create rooms and passageways. Some of the dissolved minerals are re-deposited within caves as speleothems (cave formations).

MATERIALS

Per student or small group:

- 4 ounces of modeling clay
- Sugar cubes (3-6 per cave)
- See-through bowl (cutting the top off a 2-liter bottle works well)
- Toothpick
- Spray bottle with warm water
- Lined paper
- Pen or pencil

PROCEDURE

1. Organize the sugar cubes into a half pyramid along the bottom of the bowl, making sure the sugar is pressed against one side of the bowl.
2. Seal the cubes tightly with the modeling clay, making sure there are no gaps. The clay layer should be about 1/8 inch deep. The sugar cubes that are pressed up against the glass should remain visible. This will act as a window into your cave.
3. Poke holes through the top of the clay with the tooth pick, making sure that the holes go all the way through to the sugar cubes and are large enough for water to flow through them.
4. Spray the top of the cave with the warm water from the spray bottle. Continue spraying until the sugar cubes either are no longer in their original shape or have completely dissolved.
5. As the water seeps through the clay and into the sugar cubes, record your observations.
6. Draw a picture or describe what your cave looked like when finished. Discuss: What did the sugar cubes represent? What did the clay represent? Describe in your own words how this activity simulated the formation of caves.

Adapted from Views of the National Parks, Curriculum Guide for Caves and Karst, by Kristen Lucke.

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